AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method of manufacturing an embedded multilevel interconnection, comprising:

(1) forming a hole portion in an insulating layer;

(2) forming a barrier metal film mainly comprising tantalum and nitrogen in such a manner that the barrier metal film covers at least an inner wall of the hole portion, an element composition ratio (N/Ta) of nitrogen to tantalum contained in the barrier metal film being ~~1.0~~0.3 ≤ N/Ta ≤ 1.5;

(3) exposing the barrier metal film to atmosphere;

(4) removing an oxide film formed on a surface of the barrier metal film during act (3); and

([[~~4~~]]5) immersing the barrier metal film in a plating liquid comprising copper and thereby forming an electroless copper plating film on the barrier metal film,

wherein a film thickness of the oxide formed during act (3) is controlled to be 1 nm or thinner by controlling the element composition ratio (N/Ta).

2. (Currently Amended) The method according to claim 1, wherein the element composition ratio (N/Ta) is ~~1.3~~0.3 ≤ N/Ta ≤ ~~1.5~~1.0.

3. (Previously Presented The method according to claim 1, wherein act (2) comprises irradiating nitrogen plasma upon a surface of a film which is mainly made of tantalum and accordingly nitriding tantalum.

4. (Currently Amended) The method according to claim 1, wherein act (~~3~~4) comprises removing the oxide film and leaving the barrier metal film in such a manner that the barrier metal film entirely covers the inner wall of the hole portion.

5. (Currently Amended) The method according to claim 1, wherein act (~~3~~4) comprises immersing the barrier metal film in (1) a mixture of a hydrofluoric acid and a nitric acid or (2) a diluent of hydrofluoric acid, and wherein the oxide film is selectively removed.

6. (Currently Amended) The method according to claim 1, wherein act (**[[**~~4~~**]]**5) comprises immersing the barrier metal film in a plating liquid which comprises a glyoxylic acid as a reducer.

7. (Previously Presented) The method according to claim 1, further comprising forming an electrolytic copper plating film on the electroless copper plating film by using the electroless copper plating film as a seed layer.

8. (Currently Amended) A method of manufacturing an embedded multilevel interconnection, comprising:

forming a hole portion in an insulating layer;

forming a barrier metal film mainly comprising tantalum and nitrogen on an inner wall of the hole portion and in so doing controlling composition and thickness of the barrier metal film;

removing an oxide film formed on a surface of the barrier metal film, the oxide film having been formed by exposing the barrier metal film to atmosphere;

immersing the barrier metal film in a plating liquid comprising copper and thereby forming an electroless copper plating film on the barrier metal film;

wherein by controlling the composition and thickness of the barrier metal film, after removal of the oxide film the barrier metal film essentially entirely covers the inner wall of the hole portion, thereby preventing development of a void within the hole portion, and

wherein the controlling of the composition of the barrier metal film comprises selecting an element composition ratio (N/Ta) of nitrogen to tantalum contained in the barrier metal film to be ~~1.~~0.3 ≤ N/Ta ≤ 1.5, and further comprises choosing the element composition ratio (N/Ta) for controlling a film thickness of the oxide formed in the atmosphere to be 1 nm or thinner.

9. (Currently Amended) The method according to claim 8, wherein forming the barrier metal film comprises forming the barrier metal film mainly to comprise tantalum and nitrogen having the element composition ratio (N/Ta) of ~~1.3~~0.3 ≤ N/Ta ≤ ~~1.5~~1.0.

10. (Currently Amended) The method according to claim 8, wherein forming the barrier metal film ~~comprises~~ further comprises irradiating nitrogen plasma upon a surface of a film which is mainly made of tantalum and accordingly nitriding tantalum.

11. (Previously Presented) The method according to claim 8, wherein removing the oxide film formed on a surface of the barrier metal film comprises immersing the barrier metal film in (1) a mixture of a hydrofluoric acid and a nitric acid or (2) a diluent of hydrofluoric acid, and wherein the oxide film is selectively removed.

12. (Currently Amended) The method according to claim ~~1~~8, wherein the act of immersing the barrier metal film in a plating liquid comprises immersing the barrier metal film in a plating liquid which comprises a glyoxylic acid as a reducer.

13. (Previously Presented) The method according to claim 8, further comprising forming an electrolytic copper plating film on the electroless copper plating film by using the electroless copper plating film as a seed layer.

14. (Previously Presented) The method according to claim 1, further comprising choosing the element composition ratio (N/Ta) for controlling a film thickness of the native oxide to be 1 nm or thinner.

15. (CANCELLED)

16. (Currently Amended) The method according to claim 1, further comprising choosing the element composition ratio (N/Ta) for controlling a film thickness of the ~~native~~ oxide to be 0.5 nm or thinner.

17. (Previously Presented) The method according to claim 8, wherein controlling the composition and thickness of the barrier metal film further comprises choosing the element composition ratio (N/Ta) for controlling a film thickness of the native oxide to be 0.5 nm or thinner.

18. (New) The method according to claim 1, wherein the element composition ratio (N/Ta) is $1.0 < N/Ta < 1.5$.

19. (New) The method according to claim 1, wherein the element composition ratio (N/Ta) is $1.3 < N/Ta < 1.5$.

20. (New) The method according to claim 8, wherein the element composition ratio (N/Ta) is $1.0 < N/Ta < 1.5$.

21. (New) The method according to claim 8, wherein the element composition ratio (N/Ta) is $1.3 < N/Ta < 1.5$.